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Rehabilitation of lumbar multifidus dysfunction in low back pain: strengthening versus a motor re-education model

Regarding the article “Effects of three different training modalities on the cross sectional area of the lumbar multifidus in patients with chronic low back pain”, I would like to extend my appreciation to Dr Danneels and colleagues for their interest in contributing to the literature on this important and clinically relevant topic. Unfortunately, the motor re-education dysfunction model as developed by Danneels and colleagues is to be performed ideally incorporating an isometric “pause” component which was to be main- tained between the concentric and eccentric phases of the exercise. The authors concluded that, in order to cor- rect the atrophy observed in the lumbar multifidus, patients should perform strengthening exercises targeting the lumbar extensors, ideally incorporating an isometric “pause” into these exercises. Danneels et al reported that this was the only exercise model tested that developed significant hypertrophy, and is intended to correct the multifidus atrophy seen in their experimental population.

These findings conflict with those of Hides and colleagues,1 who have published data showing correction of the pathology-induced lumbar multifidus atrophy using a consider- ably more specific and subtle activation of the multifidus muscle.2

Unfortunately, the method by which the authors measured the cross sectional area (CSA) of the multifidus muscle introduced a lage degree of methodological error, calling into question the study’s conclusions and there- fore its clinical recommendations. Using com- puted tomography scanning, Danneels et al took measurements from three arbitrary levels of the lumbar spine (the L3 superior end plate, the L4 superior and inferior end plate, and the L5 inferior end plate) recording the CSA of the multifidus muscle at each of these levels bilaterally. They then summed the right and left multifidus CSA at each of these segments resulting in a single multifidus score for each level.

In preselecting the levels from which CSA measurements would be taken, it is possible, indeed even likely, that the pathological level would have been missed entirely in at least some of the subjects. This is important because previous studies have shown that the multifidus muscle experiences its greatest loss of CSA at the primary level of pathology.3 Also problematic was the decision to sum the CSA scores at each of the preselected levels. A number of studies have shown that the lumbar multifidus, ipsilateral to the patho- logical side, experiences a cascade of neuro- morphological changes, including atrophy, in the presence of both acute and chronic patho- logy, whereas the multifidus contralateral to the pathological side experiences no such changes.4–6

Taken together, the preselection of measurement levels and the summation of the bilateral multifidus CSA would have had the effect of attenuating any side to side differences in multifidus CSA even if a subject’s level of pathology happened to co- incide with one of the levels from which measurements were obtained. Through either of these mechanisms, this measurement scheme would have introduced a substantial mass of healthy, non-motor dysfunctional muscle into each of the multifidus CSA measure- ments. The net effect of the measurement approach employed by Danneels et al, although probably intended to more discretely reflect the pathological side multifidus, was to obscure the outcome. The experimental interven- tion toward an exercise model with the ability to cause hypertrophy in healthy muscle—that is, a strengthening exercise. It is likely that the “dynamic-static” exercise rec- ommended by the authors is being most effective for correcting the pathological atrophy of the multifidus instead caused hyper- trophy of the non-pathological, non-atrophied multifidus muscle segments included in the three measurement scores. Ultimately, the study’s recommendations are unsupportable given this flaw in methodology.

The low load multifidus activation exercise, developed by Richardson et al and used by O’Sullivan and colleagues,7 is to be performed as a co-contraction with the transversus abdominis muscle, and is intended to correct a neurologically mediated loss of normal multifidus muscle volume, not unlike that seen in the vastus medialis following trauma or surgery involving the knee joint. In studies in which the CSA of a pathological multifidus muscle has been compared with its contra- lateral and “healthy” segmental partner, this form of motor re-education exercise has been shown to normalise the CSA of the pathologi- cal multifidus in as little as four weeks.

It is critical that both researchers and clinici- ans appreciate that a significant body of evidence now shows that the pathology-induced atrophy in the multifidus muscle in people with low back dysfunction is representative of a form of impaired motor control, not simple disuse weakness. As such, traditional strengthening exercises will often fail to correct this fault, just as daily physical activities fail to maintain a normal segmental CSA at the pathological level. Certainly, the historical lack of success of the rehabilitation and medical professions in treating low back pain using the vari- ety of strength based clinical models used over the last 50 years should serve as sufficient motivation to look to more evidence based models as an explanation for the condition. The motor control dysfunction model as developed over the past decade by a variety of researchers7–11 holds great promise, both as a basis for understanding the causes of back pain and in developing the effective treatment strategies for our patients.

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References

7 Richardson C, Jull G, Hodges P, et al. Therapeutic exercise for spinal segmental...

The event side doctor: the role of the orthopaedic surgeon
Orthopaedic surgeons have long had a close association with sport. International sport players have similarly gone on to careers in orthopaedic surgery, for example Jonathan Webb and JPR Williams. What is required is finding appropriate medical personnel to care for the needs of spectators and athletes at major sporting events is a challenge. Event organisers have required the skills of volunteer orthopaedic surgeons. In the position of an event side doctor for the XVII Commonwealth Games in 2002, I had the opportunity to care for the needs of spectators and athletes at major sporting events.

Increased endothelin-1 levels in athletes
Endothelin-1 (ET-1), a potential vasoconstrictor peptide, may contribute to the exercise induced redistribution of blood flow in muscles. On the other hand, the latter parameter in athletes may be expanded secondarily in the athlete as a consequence of increased ET-1 production. In this study, we found a difference in basal serum ET-1 levels between trained male athletes and normal matched male controls.

We studied 13 male professional football players (mean (SEM) age 28.1 (1.02) years; mean (SEM) body mass index 24.2 (1.2) kg/m²) and an equal number of sedentary or athletes, and back muscle

References

BOOK REVIEW
Reckoning with risk: learning to live with uncertainty
Gerd Gigerenzer has a passion for improving statistical numeracy which is rarely encountered in the normally dry statistics texts. He has researched and published extensively on how doctors and other professionals convey information to their patients. He has also shown how clinicians’ understanding of risk can be improved dramatically by changing the way they process information about risk.

The early chapters of the book look at Gigerenzer’s research into clinicians’ understanding of statistics and Bayes’s rule, and shows just how poor senior clinicians’ understanding of risk is. He shows that similar problems exist in other professions as well. He indicates how confusing it can be for our patients when we try to convey our understanding of risks to them. There is a section devoted to how companies and researchers try to change our opinion, to their advantage, with statistics. He then proceeds to show a more intuitive way to deal with statistics. Gigerenzer’s methods are powerful tools for explaining to a patient the true nature of their risks.

This book has been written for the general public, but if you find risk statistics difficult to interpret and convey, then this book is definitely for you. It is written in a genuinely instructive and well thought out style, and covers a diverse range of problems encountered in everyday as well as clinical life. I think it should be on the curriculum for all postgraduate medical courses.

Analysis
Presentation 14/20
Comprehensiveness 12/20
Readability 7/20
Relevance 18/20
Evidence basis 17/20
Total 78/100

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BASICS Refresher course
28–29 November 2002, Madingly Hall, Cambridge, UK
This two day course is directed at previous participants on the pre-hospital emergency care and immediate care courses. The aim is to maintain and update skills, incorporating the latest developments in pre-hospital care.

CALENDAR OF EVENTS
Skills Course in Musculoskeletal Ultrasound
6–8 January 2003, Oxford, UK
Further details: Alison Davies, Department of Radiology, Nuffield Orthopaedic Centre, Headington, Oxford, OX3 7LD, UK; tel: +44 (0)1865 227765; fax: +44(0)1865 227347; email: alison.davies@noc.angloxx.nhs.uk

RESEARCH LETTER
Increased endothelin-1 levels in athletes
Endothelin-1 (ET-1), a potential vasoconstrictor peptide, may contribute to the exercise induced redistribution of blood flow in muscles. On the other hand, the latter parameter in athletes may be expanded secondarily in the athlete as a consequence of increased ET-1 production. In this study, we found a difference in basal serum ET-1 levels between trained male athletes and normal matched male controls.

We studied 13 male professional football players (mean (SEM) age 28.1 (1.02) years; mean (SEM) body mass index 24.2 (1.2) kg/m²) and an equal number of sedentary or athletes, and back muscle

References

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2 T Mantzouridis
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3 T Mountokalakis
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www.bjsportmed.com
3rd Québec International Symposium on Cardiopulmonary Rehabilitation Evidence Based Interventions: Science to the Art of Cardiopulmonary Rehabilitation
11–13 May 2003, Québec City Convention Center, Québec, Canada
Call for abstracts deadline is 1 November 2002. The abstract submission form and complete programme can be printed from the web site.
Further details: email: Jean.Jobin@med.ulaval.ca
Web site: www.ulaval.ca/symp-rehab

The 6th STMS World Congress on Medicine and Science in Tennis in conjunction with the LTA 2004 Sports Science, Sports Medicine and Performance Coaching Conference
Keynote speakers include Professor Per Rentström (SWE), Professor Peter Jokl (USA), Professor Savio Woo (USA), Dr Carol Otis (USA), Dr Mark Safran (USA), Dr Ben Kibler (USA), Prof Bruce Elliott (AUS), and Professor Ron Maughan (UK).
Further details: Dr Michael Turner, The Lawn Tennis Association, The Queen’s Club, London W14 9EG, UK; email: michael.turner@LTA.org

Sports Medicine Seminar at the Hong Kong Sevens
27 March 2003, Hong Kong
This will be the first of an annual conference on Sports Medicine to coincide with the premier 7s event. Please visit the website www.droid.cuhk.edu.hk/events/sms.htm.
Further details: Iain Stewart, National Diagnostic Imaging, Woden, ACT 2606, Australia; tel: +61 2 6282 2888; email: ncdi@ozemail.com.au

INTERNATIONAL XVII PUIJO SYMPOSIUM
25–28 June 2003, Kuopio, Finland
This symposium “Physical activity and Health—Gender Differences Across the Lifespan”
Further details: Ms Auli Korhonen, Project Secretary, Puijo Research Institute of Exercise Medicine, Puijo Symposium Secretariat, Haa-paniemiesti 16, 70100 Kuopio, Finland; tel: +358 17 288 4422; fax: +358 17 288 4488; email: puijo.symposium@uku.fi

WINNERS OF THE ANNUAL BASEM PRIZES
Dr Eileen Mackie (Clopidogrel inhibits platelet activation and exercise induced ischaemia in stable coronary artery disease) and Mrs Eleanor Curry (Role of exercise in multiple sclerosis) (joint winners).
The poster prize was won by Dr Stuart Reid (Injury patterns and injury prevention strategies in the winter sports population attending the English medical centre in Val d’Isère).

Diploma in Sport and Exercise Medicine for Great Britain and Ireland
Details for the above exam can be found on the Royal College of Surgeons of Edinburgh Web site at www.rcsed.ac.uk alternative applicants can write to: The Royal College of Surgeons of Edinburgh, Eligibilities Section, Careers Information Services, 3 Hill Place, Edinburgh; tel: +44 (0)131 668 9222 or Mrs Yvonne Gilbert, Intercollegiate Academic Board for Sport and Exercise Medicine, Royal College of Surgeons of Edinburgh, Nicolson Street, Edinburgh EH8 9DW; tel: +44 (0)131 527 3409; email: y.gilbert@rcsed.ac.uk

Intercollegiate Academic Board of Sport and Exercise Medicine Diploma Exam
The following were successful diplomates in the Intercollegiate Academic Board of Sport and Exercise Medicine Diploma Exam:
7 July 2000
Dr Prabodh C Agarwal
Dr Robert Bleakney
Dr Trevor W Fleet
8 November 2000
Dr James P Robson
Dr Samantha L Fee
Dr David C Watkins
Dr RS Prabhu
For further information contact: Donald AD Macleod, Chairman, Intercollegiate Academic Board of Sport and Exercise Medicine.

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Please contact: Professor Peter Brukner: p.brukner@unimelb.edu.au (Research Degrees), Professor Kim Bennell: k.bennell@unimelb.edu.au (Research Degrees), Mr Henry Wajsweiler: h.wajsweiler@unimelb.edu.au (Certificate Courses).
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NCPAD NEWS
A monthly publication of the National Center on Physical Activity and Disability. NCPAD is the leading source for information about organisations, programmes, and facilities nationwide providing accessible physical activity and recreation. NCPAD also has a large and growing online library of fact sheets, monographs, and contact information on physical activity and recreation for people with disabilities.

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Study Sports Physiotherapy in Australia’s sporting capital at The University of Melbourne
Qualified physiotherapists may now apply for the Master of Physiotherapy by Coursework (Sports Physiotherapy), the Postgraduate Certificate in Physiotherapy (Sports Physiotherapy of the Spine, Pelvis and Lower Limb) or the Postgraduate Certificate in Physiotherapy (Sports Physiotherapy of the Spine, Shoulder and Upper Limb). The School of Physiotherapy at the University of Melbourne now has approval for these courses and applications are open to international students for full time study.

• Applications for the Master of Physiotherapy by Coursework (Sports Physiotherapy) close 1 October 2002.
• Applications for the Postgraduate Certificate in Physiotherapy (Sports Physiotherapy of the Spine, Pelvis and Lower Limb) close 1 November 2002.
• Applications for the Postgraduate Certificate in Physiotherapy (Sports Physiotherapy of the Spine, Shoulder and Upper Limb) close 1 April 2003.

Please check the website for updates and information about the courses: www.physioth.unimelb.edu.au/postgrad.html
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